$$\mu(T) = \frac{e\tau_p(T)}{m_c^*},$$

де e заряд електрона, m_c^* омічна ефективна маса.

Ключові слова: арсенід индію, розсіювання, дрейфова рухливість.

Література

[1] В. О. Москалюк, *Фізика електронних процесів. Динамічні процеси*. Київ, Україна: Політехніка, 2004.

[2] T. Saurova, D. Kuzmenko, "Research of impulse properties of indum phosphide", *Вісник НТУУ "КПІ", серія приладобудування*, Вип. 54(2), с. 49-52, 2017. DOI: 10.20535/1970.54(2).2017.119530.

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RESEARCH OF ELECTRON TRANSPORT PROPERTIES IN INDIUM ARSENIDE

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Studying the properties of semiconductor materials can improve the accuracy of modeling of the studied structures. Since the 70s of the 20th century, researchers have studied the electrical, optical, temperature and mechanical properties of indium arsenide. One of the most important characteristics of the electrical properties of a material that describes the transport properties of charge carriers is mobility. Mobility is determined by the features of the band structure of the material, as well as the pattern of manifestation of various mechanisms of scattering of charge carriers.

A theoretical study of typical mechanisms of impurity and phonon scattering of charge carriers in indium arsenide has been carried out. Scattering mechanisms were simulated based on the analytical model proposed in [1, 2]. The results of numerical simulation of the temperature dependence of the reciprocal relaxation times for typical scattering mechanisms are analyzed.

The value of the resulting pulse relaxation time τ_p determines the drift mobility of charge carriers

$$\mu(T) = \frac{e\tau_p(T)}{m_c^*},$$

where e is the electron charge, m_c^* is the ohmic effective mass. The simulation results made it possible to calculate the temperature dependence of the electron drift mobility for indium arsenide at various impurity concentrations. A numerical experiment was carried out using the technique described in [3]. The results of modeling of electron drift mobility were verified. Correspondence to experimental results was obtained.

The drift velocity of electrons in a weak electric field was also studied. The transport properties of electrons in InAs are compared with the semiconductors of group $A^{III}B^{V}$ (Si, Ge, GaAs) to which it belongs. The analysis results show that InAs is a promising material for the creation of semiconductor devices.

Keywords: indium arsenide, drift mobility, scattering rate.

References

[1] V. A. Moskaliuk, Physics of electron processes. Dynamic processes. Kyiv, Ukraine: Polytechnika, 2004. (In Ukrainian)

[2] T. Saurova, D. Kuzmenko, "Research of impulse properties of indum phosphide", BULLETIN OF KYIV POLYTECHNIC INSTITUTE. SERIES INSTRUMENT MAKING, no. 54(2), pp. 49-52, 2017, DOI: 10.20535/1970.54(2).2017.119530

[3] T. Saurova, and D. Kuzmenko, "Research of the AlGaAs impulse properties", *IEEE 38th International Conference on Electronics and Nanotechnology (ELNANO-2018)*, pp. 92–95, April 2018.

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TEN WIRELESS TECHNOLOGIES THAT WILL SHAPE THE FUTURE OF THE INFORMATION AND COMMUNICATION TECHNOLOGY MARKET

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Gartner analysts [1] named the top ten wireless technologies and trends that will drive innovation in areas such as robotics, drones, unmanned vehicles and medical equipment. Main characteristics of these trends are presented in abstract.

1. Wi-Fi. Until the end of 2024, this network technology will remain the main one both for use in simple communications (offices, homes), and for use in more complex projects - in radar equipment, as a component of a two-factor authentication system (multi-factor authentication, MFA).

2. 5G. The deployment of technology will take up to 5 years. In some cases, it can supplement Wi-Fi, as it is economical for high-speed data transmission at large facilities (ports and enterprises). Future versions of the 5G standard will improve the use of the technology in IoT and systems where a minimum data transfer delay is required. In the next ten years, 5G will not be able to cope with the exponential growth of data transfer. 6G can provide speeds up to 400 times faster than 5G.

3. V2X**.** This is the general name of the technology (vehicle to everything communications) between conventional and unmanned vehicles interacting with each other and with road infrastructure. Current and emerging V2X standards - IEEE 802.11p, IEEE 802.11bd, 3GPP LTE-V2X, 3GPP 5G NR-V2X, 3GPP 6G NR-V2X will be mandatory for all new cars. In addition, V2X will contribute to the development of new services related to road safety, navigation, etc. By 2022, this market will be valued at 1.2 billion USD [2].